REMARKS

INTRODUCTION

In accordance with the foregoing, claims 1, 7 and 13 have been amended. Claims 1, 3, 4, 7, 9, 13, 15-21 and 25 are pending and under consideration.

CLAIM REJECTIONS

Claims 1, 3, 4, 7, 9, 13 15-21 and 25 were rejected under 35 USC 102(b) as being anticipated by Hakala (US 5,847,533) (hereinafter "Hakala").

Hakala discusses a procedure and apparatus for braking a synchronous motor. In Hakala, connected between conductors 22 and 24 in the intermediate circuit of the frequency converter are braking resistors 58 and 60 in series with a braking transistor 62. During normal operation, control unit 46 controls transistor 62 in such a way that the power generated by the motor is at least partially consumed in the braking resistors. Braking resistor 58 is a normal braking resistor used to consume the returning power. Braking resistor 60 has a non-linear voltage-current characteristic as shown in FIG. 2. Its resistance is larger for high voltage values than for low voltages, corresponding to the use of a metallic resistor subject to heating as e.g. in the incandescent bulb. In other words, a resistor is used in which a rise in temperature increases its resistance in the operating range. The braking resistor may also be a positive temperature coefficient (PTC) resistor or a voltage dependent (VDR) resistor. Hakala, 2:48-2:63 and Figure 1.

Claims 1, 3 and 4

Amended claim 1 recites: "...a switching controller directly turning on and turning off one of the first and second switching units provided in respective opposite ends of the inverting part so that the overcurrent consumed by the brake resistors is changeable in proportion to a rotation speed of the motor, when the brake relays short circuit the plurality of motor windings..." Support for this amendment may be found in at least Figure 2 of the present application. As noted on page 4 of the Office Action in the "Response to Arguments" section, the controller 46 of Hakala also controls the transistor 62 so that the switching of the inverter is controlled by the controller 46 via the transistor 62. The Examiner further notes that the claim language of claim 1 is too

broad and that Hakala still reads on all of the limitations. As amended, claim 1 recites that a switching controller directly turns on/off one of the first and second switching units provided in the opposite ends of the inverting part. As such, it is respectfully submitted that claim 1 patentably distinguishes over Hakala where switching of the inverter is controlled via a transistor.

With the configuration recited in claim 1, when the brake relays short circuit the motor windings, extra variable resistors (such as the braking resistor 60 of Hakala having a non-linear voltage-current characteristic) are not needed. By directly turning on and turning off the first or second switching units provided in one of the upper and lower ends the inverting part so that the overcurrent consumed by the brake resistors is changed in proportion to the rotation speed of the motor, the effect of the dynamic braking operation of the motor corresponding to the rotation speed of the motor may be improved. Further, the motor and the brake relays are prevented from being damaged by appropriately consuming the overcurrent generated when the motor brakes.

Claims 3 and 4 depend on claim 1 and are therefore believed to be allowable for at least the foregoing reasons.

Withdrawal of the foregoing rejection is requested.

Claims 7 and 9

Amended claim 7 recites: "...directly turning on and turning off one of the first and second switching units provided in respective opposite ends of the inverting part so that the overcurrent consumed by the brake resistors is changeable according to a rotation speed of the motor..." Support for this amendment may be found in at least Figure 2 of the present application. As noted on page 4 of the Office Action in the "Response to Arguments" section, the controller 46 of Hakala also controls the transistor 62 so that the switching of the inverter is controlled by the controller 46 via the transistor 62. The Examiner further notes that the claim language of claims, presumably including claim 7, is too broad and that Hakala still reads on all of the limitations. As amended, claim 7 recites directly turning on/off one of the first and second switching units provided in the opposite ends of the inverting part. As such, it is respectfully submitted that claim 7 patentably distinguishes over Hakala where switching of the inverter is controlled via a transistor.

With the method recited in claim 7, when the brake relays short circuit the motor

windings, extra variable resistors (such as the braking resistor 60 of Hakala having a non-linear voltage-current characteristic) are not needed. By directly turning on and turning off the first or second switching units provided in one of the upper and lower ends the inverting part so that the overcurrent consumed by the brake resistors is changed in proportion to the rotation speed of the motor, the effect of the dynamic braking operation of the motor corresponding to the rotation speed of the motor may be improved. Further, the motor and the brake relays are prevented from being damaged by appropriately consuming the overcurrent generated when the motor brakes.

Claim 9 depends on claim 7 and is therefore believed to be allowable for at least the foregoing reasons.

Withdrawal of the foregoing rejection is requested.

Claims 13, 15-21 and 25

Amended claim 13 recites: "...a controller to directly control selected ones of the plurality of switching units so that the power exhausted by the brake resistors corresponds to a rotation speed of the motor..." Support for this amendment may be found in at least Figure 2 of the present application. As noted on page 4 of the Office Action in the "Response to Arguments" section, the controller 46 of Hakala also controls the transistor 62 so that the switching of the inverter is controlled by the controller 46 via the transistor 62. The Examiner further notes that the claim language of the claims, presumably including independent claim 13, is too broad and that Hakala still reads on all of the limitations. As amended, claim 13 recites that the controller directly controls the switching units. As such, it is respectfully submitted that claim 13 patentably distinguishes over Hakala where switching units are controlled via a transistor.

With the configuration recited in claim 13, when the brake relays short circuit the motor windings, extra variable resistors (such as the braking resistor 60 of Hakala having a non-linear voltage-current characteristic) are not needed. By directly turning on and turning off the switching units so that the overcurrent consumed by the brake resistors is changed in proportion to the rotation speed of the motor, the effect of the dynamic braking operation of the motor corresponding to the rotation speed of the motor may be improved. Further, the motor and the brake relays are prevented from being damaged by appropriately consuming the overcurrent generated when the motor brakes.

Claims 15-21 and 25 depend on claim 13 and are therefore believed to be allowable for at least the foregoing reasons.

Withdrawal of the foregoing rejection is requested.

CONCLUSION

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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